

## CONSERVATION STATUS OF THREATENED FISHES IN WARNER BASIN, OREGON

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**ABSTRACT.**—Two federally listed fishes, the Foskett speckled dace and Warner sucker, are endemic to Warner Basin in south central Oregon. The Foskett speckled dace is native only to a single spring in Coleman Valley. A nearby spring was stocked with dace in 1979 and 1980, and now provides a second population. The present numbers of dace probably are at their highest levels since settlement of the region. The Warner sucker historically occurred throughout much of the Warner Valley, but its distribution and abundance have been reduced by construction of reservoirs and irrigation dams and the introduction of predatory game fishes. Lentic habitats have become dominated by introduced fishes, particularly white crappie, black crappie, and brown bullhead. The largest remaining population of Warner suckers occurs in Hart Lake, where successful reproduction was documented but there is no evidence of recruitment to the adult population.

Two threatened fishes inhabit separate valleys in Warner Basin, Oregon. In Coleman Valley the only native fish is the Foskett speckled dace, *Rhinichthys osculus* ssp., which occurs in Foskett Spring along the west margin of the Coleman Lake bed. The lake is dry except during years of exceptional rainfall. The dace was listed as threatened because of small population size, trampling of its restricted habitat by cattle, and subsequent degradation of the springpool area (U.S. Fish and Wildlife Service 1985a).

To provide a refuge population free of the effects of intense livestock grazing, 50 dace from Foskett Spring were transplanted on 14 November 1979 into an unnamed spring (now known as "Dace Spring") on Bureau of Land Management (BLM) land approximately 1.5 km south of Foskett Spring. Another 50 dace were transferred into the spring on 26 August 1980. A reproducing population subsequently established in Dace Spring, and more than 300 dace of three size classes were observed there in 1986 (BLM Lakeview District, unpublished data).

The presumed historical range of the Warner sucker, *Catostomus warnerensis*, consisted of the main Warner lakes (Pelican, Crump, and Hart) and other accessible lakes and sloughs in Warner Valley, and low- to moderate-gradient reaches of tributary streams. The species description by Snyder (1908) was based on specimens collected from

Deep (= Warner) Creek near Adel. The Warner sucker was listed as threatened primarily because of fragmentation of stream habitats by irrigation diversion dams and the establishment of large populations of introduced piscivorous fishes in lentic habitats (U.S. Fish and Wildlife Service 1985b).

Long-time residents recalled that during the 1930s large numbers of spawning Warner suckers (referred to as "redhorse") ascended Honey Creek far into upstream canyon areas (Andreassen 1975). By the 1970s the species range was fragmented by numerous irrigation diversion dams on the lower reaches of streams tributary to Pelican, Crump, and Hart lakes (Andreassen 1975, Kobetich 1977, Swensen 1978, Coombs et al. 1979, Hayes 1980), which block spawning runs from the lakes into streams.

Coombs et al. (1979) found that although habitats had been fragmented resident stream populations still persisted. Nearly two-thirds of all adult suckers (198 of 300) were captured by Coombs et al. (1979) in the canal between Anderson and Hart lakes, immediately north of the Hart Lake spillway. Adult and larval suckers also were captured in Snyder Creek, in Honey Creek above the dam at Plush, at the mouth of Honey Creek in Hart Lake, at the south end of Warner Valley in Twentymile Creek between the south end of the valley floor and the confluence with Twelvemile Creek, and in Twelvemile Creek immediately above and below the O'Keefe Diversion Dam.

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In 1980 Coombs and Bond (1980) sampled 22 sites throughout the basin, capturing 46 Warner suckers at 4 localities: Honey Creek between Hart Lake and the dam at Plush, canals of Deep Creek at the east end of Pelican Lake, the spillway immediately north of Hart Lake, and Swamp Lake. In 1983 Smith et al. (1984) captured 1 adult Warner sucker in Crump Lake and 2 juveniles (approximately 130 mm total length [TL]) in Deep Creek between Adel and the falls. In 1987 an adult Warner sucker was caught by an angler along the slough just south of Flagstaff Lake (J. E. Williams, personal observation).

This paper summarizes the current status of these two threatened fishes, as determined by surveys conducted from 1987 to 1989. Other native fishes of Warner Valley include a local form of redband trout (*Oncorhynchus mykiss* ssp.), tui chub (*Gila bicolor*), and the common form of speckled dace (*R. osculus*). The Warner Valley redband trout largely has been displaced by introduced trout and is listed as "of special concern" by the American Fisheries Society (Williams et al. 1989).

#### HABITAT DESCRIPTION AND SURVEY METHODS

The Warner Basin comprises 6858 sq km in south central Oregon and small portions of northeastern California and northwestern Nevada (Fig. 1). Drainage is internal and is divided between Coleman Valley and the much larger Warner Valley. Coleman Valley is a separate drainage in the southeastern part of the basin and receives sparse runoff. Observations of the Foscett speckled dace and its habitat in Coleman Valley were made from 1987 to 1989. Standardized transects were established along Foscett Spring and its outflow to monitor vegetation recovery following cessation of grazing, and to quantify amounts of open-water habitat.

In Warner Valley all water flows into a series of north-south oriented shallow lakes, sloughs, and potholes. During periods with above-average precipitation, as occurred during the early 1980s and again in 1989, these lakes fill from the south and eventually overflow into the northern part of the valley. Only the three most southerly lakes, Pelican, Crump, and Hart, are permanent. Fish collections in Warner Valley were made from 1987 to 1989. Samples were collected from

lakes by use of traps, gill nets, and seines, and from streams with dip nets, trap nets, electroshocker, kick nets, and seines. Most fishes were identified, measured, and returned to their habitat. Voucher specimens or those accidentally killed during collecting are housed at the Wildlife and Fisheries Museum, University of California, Davis. Opercles from five suckers were aged according to the methods described by Scopettone (1988). Visual observations were made of spawning Warner suckers in Honey Creek.

#### FOSKETT SPECKLED DACE

In 1987 the BLM acquired Foscett Spring and the surrounding 65 ha, of which approximately 28 ha were fenced to exclude cattle. The dace population at Foscett Spring has since expanded to the spring pool, its outflow, and downstream marsh. Baseline water quality and vegetation monitoring at Foscett and Dace springs were initiated by BLM in 1987. The following data collected on 28 September 1988 from Foscett Spring and Dace Spring, respectively, exemplify the two habitat similarities: air temperature 19 and 17 C, water temperature 17 and 16 C, dissolved oxygen 5.3 and 5.9 mg/l, conductivity 350 and 250 mohs/cm, pH 8.1 and 8.2, alkalinity 114 and 99 mg/l CaCO<sub>3</sub>, hardness 40.0 and 24.7 mg/l, and turbidity 1.4 and 1.8 NTU.

The dace population maintains itself at Dace Spring despite a tendency for vegetation to choke out most open water. The introduced population has expanded by movement of fish through a connecting pipe into a livestock watering trough just east of the spring. No other fish occur in Coleman Valley.

#### WARNER SUCKER

Surveys on Twentymile Creek above and below the Dyke Diversion Dam located 1 adult and 2 larval Warner suckers in 1988. Additional 1987 and 1988 surveys failed to locate Warner suckers elsewhere in Twentymile Creek (including sections in Nevada and Oregon upstream of the Nevada border), the canal north of Hart Lake, the slough between Flagstaff Lake and Mugwump Lake, the slough between Lower Campbell and Campbell lakes, or Stone Corral Lake. In April 1989, 28 adult suckers were captured at the

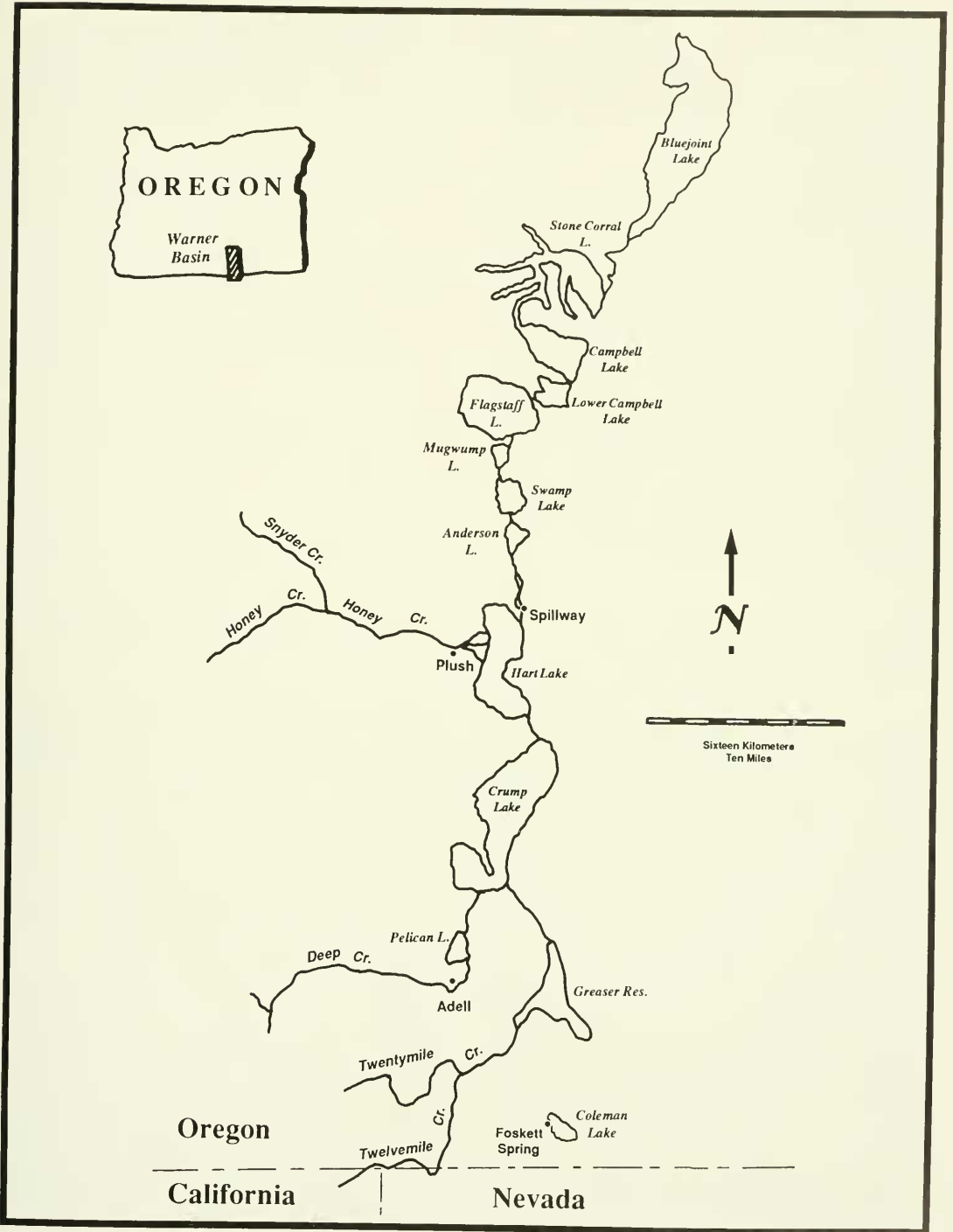


Fig. 1. The Warner Basin of south central Oregon.

TABLE 1. Frequency of fishes collected in Warner Basin during 1987–89. All collection sites are in Lake County, Oregon, unless otherwise noted. Collections made at the same habitat are combined.

Location	Warner sucker	Tui chub	Speckled dace	Trout <sup>a</sup>	White crappie	Black crappie	Large-mouth bass	Spotted bass	Brown bullhead
Twelvemile Cr. (Washoe Co., NV)			404						
Twelvemile Cr.			591	51					
Dyke Diversion Canal			1						
Irrigation canal along Twentymile Cr.		1						1	1
Twentymile Cr.	6	25	854	5		2			4
Greaser Reservoir		476				1			2
Deep Creek			400	40					
Hart Lake	70	12			1620	14	1		449
lower Honey Creek	69								
upper Honey Creek			19						
canal north of Hart Lake	7	2			31	30	1		
Anderson Lake		7			10				1
Flagstaff Lake slough		27			107	59			40
slough between Lower Campbell and Campbell		82			39				
Campbell Lake					371				95
Stone Corral Lake		17			5				
Total caught	152	649	2269	96	2183	106	2	1	607
Relative catch (%)	2.5	10.7	37.4	1.6	26.0	1.7	<0.1	<0.1	10.0

<sup>a</sup>May include native redband trout and/or introduced rainbow trout.

mouth of Honey Creek in Hart Lake, and 42 were captured along the east side of Hart Lake. Fish ranged from 311 to 440 mm TL (avg. 385.2,  $n = 70$ ), with most 350 to 410 mm. Approximately 80–100 other adult Warner suckers were observed in Honey Creek between the most downstream diversion dam and Hart Lake. These fish were in breeding condition and migrating upstream, where they were visible because flow in the creek was reduced by upstream diversions. In mid-May 1989 water began spilling from Hart Lake into the canal toward Anderson Lake. Suckers dispersed into the canal, and 7 spawners were collected there in June. Standard length, TL, and age of 5 of these were 331, 357, 7; 307, 361, 7; 333, 387, 7; 335, 390, 9; and 340, 397, 8. Larval suckers also were collected from Honey Creek just above the downstream-most diversion dam, indicating at least limited spawning upstream.

Overall, Warner suckers constituted only 2.5% of all fishes collected during 1987–89 (Table 1). Nearly all suckers were found in Hart Lake, Honey Creek just upstream of

Hart Lake, or the canal immediately north of the lake. Introduced fishes dominated the fauna of Hart Lake and other lakes and sloughs in the valley. White crappie (*Pomoxis annularis*) and brown bullhead (*Ictalurus nebulosus*) outnumbered native fishes in our collections from Hart Lake by slightly more than 25:1. Tui chub, which historically was the most abundant fish in lentic habitats, largely has been replaced by white crappie.

The Warner sucker population appears to be largest in Hart Lake, but no recent recruitment could be documented. Except for a small number of larvae in lower Honey Creek, no suckers smaller than 310 mm TL were found. White crappie were abundant at the mouth of Honey Creek during June and may have preyed on sucker larvae as they drifted into Hart Lake. A single trap net set there in June collected 1530 white crappie and 20 brown bullhead.

#### DISCUSSION

The Foscett speckled dace appears to be near recovery. No exotic species are present



in either spring, and the primary threats have been eliminated. Some vegetation needs to be cleared from the pool at Dace Spring in order to provide sufficient open water. Also, fencing along the boundary of Dace Spring should be extended to the east to include additional habitat. Continued habitat and population monitoring are necessary at both springs because the small habitats are vulnerable to slight disturbances.

The largest remaining population of Warner suckers appears to be in Hart Lake, where spawning fish ascend lower Honey Creek and the canal north of the Hart Lake spillway. Populations also may exist in Crump and Pelican lakes.

Successful recruitment of young into the Hart Lake population is limited by reduced spawning habitat in Honey Creek and large populations of crappie. White crappie were introduced into Hart Lake in 1971, and white plus black (*P. nigromaculatus*) crappie were introduced into Crump Lake during 1972 and 1973 (Oregon Department of Fish and Wildlife, unpublished data). Subsequent collections of the Oregon Department of Fish and Wildlife indicated that white crappie, black crappie, and brown bullhead were common in Crump Lake by 1978 (K. Daily, unpublished data) and presumably in Hart Lake as well. Adult white crappie commonly feed on small fishes (Pflieger 1975); thus, their abundance at the mouth of Honey Creek during the same time that larval suckers were collected from the creek increases the likelihood of predation on young-of-year suckers.

Seven irrigation dams on Honey Creek between the lake and Plush result in limited access by adults to upstream spawning areas. During 1989 only two riffles between Hart Lake and the first diversion dam contained suitable gravel for spawning. Depending on stream flows, water-diversion boards may be placed in the irrigation structures before, during, or after the spawning run. Swenson (1978) reported that during 1978 adult suckers migrated as far as the seventh irrigation dam at Plush before boards were installed and water diverted for irrigation.

A remnant population of Warner suckers may persist in Crump Lake, as indicated by collection in 1989 of young-of-year in Twenty-mile Slough below Greaser Dam. Additional surveys of Crump and Pelican lakes

are needed to determine the extent of any remaining sucker populations. If present, however, recruitment may be prevented by populations of crappie.

In conclusion, Warner suckers once were common throughout the basin but gradually declined from about 1900 until the early 1970s as a result of agricultural development and placement of irrigation structures in spawning streams. Despite habitat fragmentation and lack of fish passage, recruitment to lake populations continued until the late 1970s, when large populations of piscivorous fishes became established. Recruitment of Warner suckers continues in stream habitats but appears from our observations to be greatly curtailed since 1979.

Control of introduced fishes in Hart and Crump lakes may be impractical because of habitat size (2928- and 3108-ha area, respectively) and large populations. Recovery of the Warner sucker in Hart Lake therefore at least requires increased spawning sites and rearing habitat.

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